visited the West Indies to investigate this problem, and, in spite of the nature of the lavas, felt bound to reject the conclusion owing to the palæontological and tectonic evidence.

South America itself, according to Prof. Suess's interpretation, has a uniform structure without any trace of the earlier geographical plans which he admits in other continents. The mountains trending from north-west to south-east in the Argentine he explains as connected with the Andes, an opinion different from that of some Argentine geologists; and as it is conceded that the Sierra de Tandil does not belong to the Andes, there seems evidence for the existence of an older mountain system.

The English translation has been issued as vol. iv., without the plates, maps, appendices, and index, which are to follow. The translation shows evidence of haste, and it has missed the revision by several distinguished geologists of which the preceding volume had the benefit. Miss Sollas has done her part of the work well, as the translation reads easily; but in a work of such geographical importance it is a pity that the geographical terms were not more carefully revised. Thus the depressions on the oceanic floors known in German as "Rinnen" are translated as "channels" (p. 294), a term which connotes the idea of flow, so that the term "trench," recommended by the International Geographical Congress, is preferable. "Die Stauung der ersten Welle" (p. 438) is translated (p. 382) as "the stowing of the first wave," whatever that may mean. More serious objection can be taken to the translation of "Das Zwischen Gebirge," in which Prof. Suess includes all the mountains in Canada and the United States west of the Rockies with the exception of the Mount St. Elias chain, as the Intermediate "Range." The term range is so unsuitable to a vast area of mountain country, which includes many mountain ranges, that the translation cannot always adopt it; so when Prof. Suess says (p. 479), "Das Zwischengebirge in ein Meer von submeridionalen Zügen aufgelöst," the English version reads, "The Intermediate *Chain,* broken up into a sea of submeridional *ranges.*"

As an illustration of the inconsistency in the translation of geographical terms, it may be remarked that Gebirge, Züg, and Kette are all sometimes translated as range; while Gebirge and Kette are also both sometimes translated as chain. British students will find the irregular treatment of place-names inconvenient and puzzling. Such variations as Brazilia and Brasilia are unimportant, though hardly to be expected in a work issued by a University Press; but many of the variations introduced are confusing. Thus, Prof. Suess speaks of the Sea of Ochot'sch, and calls some adjacent mountains the Ochitiden. The translation, by adopting Okhotsk (p. 328) for the sea and Ochotides for the mountains, obscures their connection; the latter name is once spelt Okhotides. The Yana of p. 331 is the Jana of p. 332; and the Chuchki Peninsula of p. 358 is the Chukchi of p. 377. The Chaja of Suess is sometimes repeated in that form (p. 334), sometimes as Khaja (p. 335), and as Chaya (p. 337). Kegyl (p. 334) is Kygyl on p. 339.

Many of the names in the translation appear in German forms, and are difficult to find in British atlases; thus the lake, which in the *Times* atlas appears as Yege—a reasonable transliteration—is spelt Eche or Esse. Yezo appears as Hokkaido, and Gilolo as Halmahera. The Vistula is mentioned thrice, but its identity is each time concealed by the retention of its German name, Weichsel; "from the Weichsel to Dakota" (p. 88) does not give much information to a student limited to British atlases or gazetteers. Further confusion is added by the differences between the text and the figures; thus Werchne in Fig. 28 is the Verkhne of the text, and Werchojanskij in the same figure occurs as Verkhoiansk in the text.

In the French edition the original technical terms are often quoted in brackets after the translation, and as that excellent precedent has not been followed it would be convenient if, in the index-volume, a list were given of Prof. Suess's geographical terms with the translations adopted. J. W. GREGORY.

EXPLORATIONS OF INDIA.

The Gates of India. Being an Historical Narrative. By Colonel Sir Thomas Holdich, K.C.M.G. Pp. xv+555. (London: Macmillan and Co., Ltd., 1910.) Price 10*s.* net.

THESE "Gates of India" are the gates beyond the Indus, the difficult tracks through which all the great historic invaders of the country made their way prior to the days of oceanic exploration. There are few men more competent to write about them than Sir Thomas Holdich, who knows them from the Pamirs to Makran, though he hardly refers to his own achievements as a geographer, but treats the matter mainly from the historic standpoint, beginning with the Medes and Persians, and ending with Pottinger and Burnes and their contemporaries.

For the purposes of review we may divide the book into three parts. The first part—a quarter of the whole—deals mainly with what may be called the conjectural period of Assyrian and Persian and Greek. The second part—another quarter—is taken up by the Arabs; here the observer, describing country as wonderful as it is inaccessible to ordinary people, keeps conjecture subordinate to facts of observation. The third part, occupying nearly half the book, reviews the explorations and adventures of the modern European period; here facts predominate, and the romance of the story is of an individual kind.

We propose to give precedence to the second or Arab period, as this part of the book is the most original and certainly the most novel.

Everyone, of course, knows in a general way that Arab merchants and slave-dealers went everywhere—their footprints have been left all over Africa; Algerian slave-hunters even raided the coasts of Iceland once upon a time—but amid the alarums and excursions of historians and archæologists intent on Macedonian and Mogul invaders and Buddhist monuments, most people nowadays need to be told that "the whole of the Indian north-west frontier was much traversed by and thoroughly well known to the Arab trader."

Sir Thomas Holdich has much to say about these old Arab caravan-routes and trade-centres, and much that is surprising to tell of the oblivion that has overwhelmed them. In Sind he has stood upon the site of an Arab city of which nothing whatever is left but traces of its cemetery. In the Helmund valley he has seen broken pottery "literally in tons"—the only remaining evidence of a vanished polity. In Central Afghanistan one may follow in the footsteps of the old Arab traders, with the story of their travels in hand, and may recognise the physical features of the road, but of the flourishing market towns that they mention there may be nowhere discernible "the faintest outward indication"—everything is now by Time's fell hand defaced. Only in southern Baluchistan did the author find, besides pottery and graves, undoubted ruins of cities and huge masonry dams that once held water-supplies.

The mediæval Arab traders used two main systems of communication, one through Herat and Afghanistan to Kabul and Afghan Turkestan, the other through southern Baluchistan (Makran) to the lower Indus valley. The routes of both systems are followed out by the author, and are illustrated by most excellent maps. In the account of the northern routes there are some short but interesting descriptions of those parts of the country that are least generally known. Something is said of Seistan, "the great central basin of Afghanistan, where the Helmund and other Afghan rivers run to a finish in vast swamps, or lagoons." The author speaks of it as a flat, unwholesome country, with remains of a really fine system of irrigation, and thinks that it does not justify its olden reputation as the granary of Asia. It must be remembered, however, that the Babylonian country, which in the time of Herodotus was by far the most fruitful known, and where the millet grew to such a height that Herodotus, though he well knew it, would not mention it lest it should appear incredible, does not at the present time justify its ancient reputation. Incidentally we also learn that Zamindawar, to the north-east of Seistan, and also watered by the Helmund, is a prolific region; that in northern Afghanistan the economic value of the Murghab river is still great; and that much of Afghan Turkestan is rich in agricultural possibilities. The author thinks that some of these "roads of the old khafila travellers may again be the roads of modern progress"; and he extols the route from Kabul and Ghazni to the Helmund as one of the "grandest high-roads in Asia, from the days of Alexander to those of Roberts."

The chapter on the "strange land of Makran"—the land of Gedrosia, where Alexander discovered that a trackless and waterless desert under a burning sun was an enemy against which even his unconquerable energy was impotent—is perhaps the most interesting and novel of the whole interesting story.

In days contemporaneous with the Heptarchy, the Arabs ruled Makran, and it was through Makran that they invaded India and conquered Sind.

> "For three centuries there existed through Makran one of the great highways of the world, a link west and east such as has never existed elsewhere on the Indian border, save, perhaps, through the valley of the Kabul river and it affluents."

This highway ran about fifty miles north of the Makran coast that proved so disastrous to the Macedonian army, and behind the successive ranges of hills that face that coast. The author thinks that it may yet develop into a line of railway between India and Europe, particularly as it would enjoy the unique advantage, from a British point of view, of command and protection from the sea.

We get glimpses of some of the natural wonders of the Makran coast that almost remind us of pages of Hakluyt; submarine mud volcanoes, weird and fantastic strata, piles of sea-shells on upraised mud-flats, desiccated forests with the trees waiting to be fossilised as they stand; stiff, straight, spurless ranges of hills lying east and west like parallel lines of ramparts, with long, narrow, flat-bottomed valleys between them; and the curiosity of the archæologist will be whetted by allusions to ruined cities and tombs and gigantic irrigation works.

The interest of the latter half of the book is of quite a different kind. We now shake off the fascination of a dim storied past, and come face to face with the facts and political intrigues of the nineteenth century. Here we find an abstract and brief chronicle of the adventures of Christie and Pottinger, of the extraordinary Masson, of Lord and Wood, of the ill-fated Moorcroft, of Burnes, of Vigne, of Broadfoot, and of Ferrier.

The author remarks, as a strange fact, that we are indirectly indebted to Napoleon Buonaparte and his nefarious designs on India for these early explorations of Afghanistan. On the same chain of causes, we may note in passing, hang the discovery of the Rosetta stone and the key to the arcana of ancient Egypt. Thus do we by indirections find directions out, and thus he that increaseth sorrow sometimes increaseth knowledge.

The author thinks nobly of his predecessors in the exploration of the gates of India. As explorers he calls them "magnificent." He in no way approves the opinion that their work is superseded, and he is inclined to doubt whether the superior mechanical equipment of the modern explorer altogether balances the superior methods of the pioneers who lived among the people, adopted their dress, ate their salt, and talked their "shop."

A few words may be said about the first part of the book, which contains, *inter alia*, an introduction, and an account of Alexander's invasion of India. Here we think that the author hardly does himself justice; there is too much conjecture, not always relevant, and there are some statements and rather airy assertions that are hard to accept. For instance, the delightful history of Herodotus, which was written to the pious intent that the great and wondrous deeds of men might not be effaced by time, is referred to, almost barbarously, as a "geographical treatise," and, worse still, as a "gazetteer." Again, on p. 13, there is an extraordinary assertion about sailors and geography. If we have not misinterpreted it, it implies, if it does not actually assert, that sailors are not of much account as geographers. Now, among the things that we have kept from our youth up—and we fancy we are not singular in this respect—is a firm belief that the greatest of all geographers were sailors, and we venture to adduce the names of Magellan, Columbus, Drake, Baffin, Davis, Hudson, Cook, Franklin, Ross, and McClintock in support of it, not to mention any names of those now living. Once more we demur to the use, in any literal sense, of such metaphorical expressions as "early Persian Department for geographical intelligence." The early Persian expeditions that we know anything about—namely, those against Greece—relied on spies and on guides picked up at the moment. Finally, where so much is said about Greeks and Alexander one is disappointed to find the famous Macedonian pike (sarissa) disguised as "sarina"; and ballistæ and catapeltæ (did Macedonians use the Roman ballista?) translated as "mounted infantry and artillery"; and Nearchus appearing now (correctly enough for those who like that fashion) as Nearkhos, and now (to suit no fashion) as Nearkos. In the case of a name like Nearchus, the free and easy fashion approved by Mr. Tony Weller is hardly to be commended. These things are blemishes which we should not care to remark if the book were not so good and so fresh in its essentials.

GENERAL BIOLOGY.

Allgemeine Biologie. By Oscar Hertwig. Dritte Auflage. Pp. xviii+728. (Jena: Gustav Fischer, 1909.) Price 16 marks.

IN the review of the second edition of this work, which appeared in this journal in 1906, it was pointed out that for any single man to undertake to give a circumstantial and critical account of the numerous problems of modern biology, and to support the conclusions arrived at by a sufficient record of the facts on which they are founded, is too stupendous a task, and one which certainly cannot be adequately carried out in a single volume. The third edition of Dr. Oscar Hertwig's book follows soon after the second, and it is to be inferred that it has been useful to a large circle of readers in Germany and elsewhere, though it has not attracted so much attention in England. It is doubtful whether the third edition will be more successful in this country than its predecessor. It is enlarged by the addition of eighty pages, and the illustrations in the text, which are well chosen and for the most part admirably executed, have been increased in number from 371 to 435.

Dr. Hertwig is a lucid writer, and has a style which attracts the reader and carries him easily through many difficult places, but in almost every chapter he leaves a certain sense of disappointment. There is a vast amount of information, and the argument is clear, and in many places convincing, but the detail is insufficiently worked out. This, perhaps, is no great fault in a text-book, if such information as is given is founded on the best and most recent authorities, and the references to literature are sufficiently full and up-to-date. But it cannot be said that this is always the case. To take some examples, the author informs us in the preface that the sections on the maturation divisions of the germ-cells, on natural and artificial parthenogenesis, on hybridism and the biogenetic law, have been largely re-written and revised in this edition.

In the section on the maturation divisions we are disappointed in finding that the discussion turns mainly on the phenomena observed in Ascaris. The work of vom Rath, Rückert, and Korschelt is also dealt with, but there is no mention of Farmer and Moore's important papers on the Maiotic phase in animals and plants, and their papers, which surely are old enough to be incorporated in a text-book published in 1909, are not even quoted in the list of literature. The section on natural and artificial parthenogenesis is more satisfactory, as a fair summary is given of the more important experimental researches on this subject up to the year 1908. The discussion of the results is, however, somewhat unconvincing.

Mendel's law, which was ignored in the second edition, is concisely dealt with in the latter half of chapter xiii. Here only a few simple cases are quoted to illustrate Mendelian principles, and no discussion of more complicated and unconformable cases is attempted. As in many other parts of the book, the experiments of Continental authors are quoted, but the large amount of English work on the subject is not taken into account.

Dr. Hertwig is quick to take advantage of the results of Mendelian work in support of his own theories of inheritance, but it is not always easy to understand in this connection, as in many others, what his real opinion is. It might be described, in Mendelian terms, as a polyhybrid of several theories promulgated by different authors; and sometimes one is inclined to think that, under stress of argument, his system resolves itself, by a process of segregation, into its original elements. He maintains, as he was one of the first to assert, that the chromosomes are the bearers of the heritable qualities of the organism, and it may be said in this connection that he disposes too easily of the evidence furnished by Crampton, E. B. Wilson, and others, that specific organ-forming materials are located in the cytoplasm of the egg. But while admitting the existence of a nuclear idioplasm, he will have nothing to do with Weismann's theory of biophors and determinants, but holds with Nägeli that the idioplasm has a micellar structure, and that it is distributed equally to every product of cell-division. None the less, he speaks of particles (Teilchen) which are bearers of inheritable qualities, and comments on the fact that Mendelian experiments show that these particles must be mobile and capable of forming new combinations. Hence, he says, it is clear that the chromosomes cannot retain their individuality, but must be regarded as tactical combinations of smaller units. Few will be disposed to quarrel with this conclusion, but it is not obvious wherein these "smaller units," capable of entering into tactical combinations, and representative of the specific or racial characters (Merkmale) of the adults, differ from Weismann's determinants.